



Drones

Table of Contents

| | |
|---|---|
| What is a Drone? | 2 |
| Multicopter..... | 2 |
| General information | 2 |
| Basic Components of drones | 3 |
| Types of Drones..... | 4 |
| Application of Drones | 5 |
| Pros and Cons of Drones | 6 |
| A. Technical Challenges of drones..... | 6 |
| B. Cases of drone's abuses | 7 |
| Future of Drones..... | 7 |
| Delivery drone in AMAZON Prime Air..... | 7 |

What is a Drone?

A drone is a flying robot that can be remotely controlled or fly autonomously through software-controlled flight plans in their embedded systems, working in conjunction with onboard sensors and GPS.

A drone is a broad term that can refer to any unmanned aircraft. It can refer to military drones, but it usually refers to multirotor.

Multirotor

A multirotor has three or more propellers that can be used to hover or fly in any direction. The most common type is a quadcopter, which has four propellers.

One important thing to note about this multi-propellers system is that even if any motor inside this device stops working, it will keep on flying as it gets support from propellers working in groups.

Drones that possess a large number of motors inside can gain more control over their elevation and hence can carry more loads during flight.

General information

- These crafts can carry out an impressive range of tasks, ranging from military operations to package delivery.
- Drones can be as large as an aircraft or as small as the palm of a hand.
- Drones were originally developed for the military and aerospace industries.
- 2010-today is considered to be the "Golden Age" of drones since the use of drones is becoming more popular. Because of their smaller size and portability, drones can be used by police forces and fire services for surveillance or used by hobbyists.
- A drone, in technological terms, is an unmanned aircraft. Drones are more formally known as unmanned aerial vehicles (UAVs) or unmanned aircraft systems (UASes).

Basic Components of drones

❖ The Transmitter (TX)

The transmitter enables the user to control the aircraft from a distance, using 2.4 gigahertz spread spectrum radio signals.

❖ The Receiver (RX)

Receivers are electric devices with built-in antennas that intercept the radio signals from the transmitters and convert them into alternating current pulses. The receiver then produces information and sends it to the Flight Control Board.

❖ Flight Control Board

After the transmitter is switched on and the main power source – the Lipo battery – is plugged in, the receiver starts communicating with the transmitter. From this moment, the receiver will send every signal to the onboard computer.

The sensors on the computer will make sure the aircraft is stable, even under windy conditions, which makes controlling the aircraft easier – even for beginners.

As the transmitter sends signals to the aircraft, the onboard computer sends signals to the electric speed controllers. The E controllers can control the amount of voltage received by the motors to control each propeller's speed. This system allows the quadcopter to maneuver.

❖ The battery (lithium polymer battery)

The LiPo battery is rechargeable and lightweight, capable of delivering high discharge rates to provide enough power to the brushless electric motors.

❖ Electronic speed controller

The electronic speed controller is connected to the LiPo battery and controls the rotational speed of the motor by adjusting the electric current (Amp) to ensure the motors are running smoothly and efficiently.

The controller has a built-in governor, which keeps the motor's RPM (rotation per minute) at a steady level in every flight condition.

❖ The electric motor

On the outside of the motor, there are magnets attached to the inner wall, called the rotor (the spinning part). There are also permanent magnets on the inside of the motor, called the stator.

As the electricity runs through these magnets, it creates an electromagnetic field that attracts and repels the magnets in the stator. The constant change of polarity keeps the motor spinning.

❖ The propeller (props)

The propeller converts the motion into lifting power. Because of the special shape of the blades, the air pressure is uneven on two sides while they are in motion, which creates lifting power. The principle can be easily modeled by Newton's third motion law and Bernoulli's principle.

Types of Drones

There are four different types of drones. Each one of them has a feature that differs from others.

1. The first one is called Multi-Rotor Drones

Multicopter drones are considered the most common types of drones as they can be used by a professional or a regular person. They are mostly used for aerial photography. Multi-rotor drones can be more classified based on the number of the rotor, tricopter, quadcopter, hexacopter, and octocopter.

Moreover, this type has a downside, and it is the energy will limit your time of flying as its very limited source.

2. The second type is Fixed Wing Drones

This type has a different design and builds to the multi-rotor. This type uses wings like normal airplanes, and it never uses energy to stay floating in the air and; because of its design, the fixed-wing drones cannot stay standstill on the air, but it moves forward by a guide control.

Also, this type is having a much higher cost and more time to fly compared to the multi-rotor.

3. The third type is Single Rotor drones

This type looks very similar in design and structure to the actual helicopter. It has one rotor model that has one big size rotor and a small one on the tail. The single rotor drones are much more efficient than the multi-rotor. They have longer flying times and can be powered by gas.

4. The last one is Hybrid Vertical Take-off and Landing.

Hybrid VTOL combines the benefits of multi-rotor platforms with fixed-wing drones and transitions between the two modes during flight. VTOL fixed-wing drones are a good choice for a wide range of commercial and military aerial applications.

Application of Drones

There are many applications of drones:

1. Aerial Photography is a common use of drones as with drones, we can take a picture from different angles easily, and that because drones can move easily, they can go tight area due to their small size.

2. shipping and delivery

Some drones can carry heavy payloads, which makes them a good choice for shipping and delivery. It will help people get fast service, and the drones will not be stuck in road jams.

3. In the field of agriculture

one of the achievements of this technology is that it can serve farmers for many purposes.

Drones can take an aerial image of a large area for study, and the farmers can check their plants either they are good or not. Also, some farmers use drones to spray fertilizers and water.

4. Engineering applications

Many engineering companies are currently using drones to monitor their projects, such as transportation cables and oil pipelines, and to ensure the safety of equipment for maintenance.

5. search and rescue operations

Drones can be equipped with a thermal sensor so they can locate the position of a person. Moreover, these drones can work at any time of the day, regarding the weather stat.

Pros and Cons of Drones

❖ Advantages of drones:

There are four main benefits of drones:

MAINTAINING SAFE ENVIRONMENT: With their remote-control abilities, Drones monitor locations, communicate possible hazards, and notify threatening conditions.

PRECISION: UAVs appropriate GPS in their software, which is why they can be programmed and guided precisely to specific locations.

FLEXIBILITY AND EASY CONTROLLABLE OR DEPLOYABLE: The regular advancement in drone-control technology allows operators to quickly deploy and operate drones even with a relatively minimal technical background.

MINIMIZES OBVIOUS DANGER AND HEALTH RISKS: numerous dangers like elevation, wind, weather, and radiation that were earlier suffered by crew members have been replaced with more viable and safer alternatives.

❖ Disadvantages of drones:

A. There are three main Technical Challenges of drones:

EASY TO LOSE CONTROL: There are occasional instances where operators lose control of their UAV during the flight.

WEATHER DEPENDENT: Drones are more vulnerable to weather conditions when contrasted to traditional aircraft.

EASY TO HACK: Hackers can quickly attack a drone's central control system and become the drone's original controller.

B. There are three cases of drone's abuses:

CRIMINAL USE: There are many reports of criminals using drones to supply illegal and banned items into prisons, such as drugs.

PRIVACY VIOLATION: Drones can fly high and record visible parts of private property. It can be used to spy inside homes through windows, or it can do some invasion of privacy.

POTENTIAL THREAT TO NATURE: Drones are vulnerable to wild animal attacks and can also pose a threat to nature.

Future of Drones

The future uses for drones are only limited by our imagination.

By 2050, the USA is looking for having full integration of airspace at low and high altitudes and having multiples of missions, including:

1. a variety of vehicles of all sizes.
2. searching for and rescuing people.
3. monitoring traffic during rush hour.
4. reporting accidents to authorities with quick response.
5. two drones will communicate with each other.
6. detecting fires.
7. passenger drones.
8. using data capture.
9. delivery drones.

Delivery drone in AMAZON Prime Air

AMAZON Prime Air is a future delivery system designed to safely get packages to customers in 30 minutes or less using drones.